What is claimed is:

1. A method of accessing a channel in a communication transceiver coupled to a communications channel, the transceiver adapted to provide carrier sense signals including a fast carrier detect (FCD) generated relatively shortly after the start of transmission, having a high false alarm rate and indicating that a transmission may be starting and a carrier detect (CD) signal generated a relatively long time after the start of transmission, having a low false alarm rate and indicating that a transmission is starting, said method comprising the steps of:

establishing a channel contention period upon termination of a current transmission session, said channel contention period divided into a plurality of time slots, the width of each time slot substantially equal to the time of said FCD signal;

initializing a backoff counter with a backoff count equal to a random number of time slots;

decrementing said backoff counter while said medium is idle;

suspending said backoff counter upon receipt of a FCD signal;

resuming decrementing said backoff counter upon failure of a CD signal to arrive within a CD time;

deferring transmission until a next contention period upon receipt of a CD signal; and

starting transmission upon expiration of said backoff counter.

2. The method according to claim 1, wherein termination of said current transmission session is indicated by a change in state of said channel from busy to contention.

3. The method according to claim 1, further comprising inserting a contention interframe space (CIFS) between the end of a previous transmission session and the start of said channel contention period.

4. The method according to claim 1, further comprising the step of attempting to reserve said channel upon the expiration of said backoff counter.

5. The method according to claim 1, further comprising the step of reserving said channel by sending a request to send (RTS) frame incorporating a reservation time to a destination station.

6. The method according to claim 1, further comprising the step of reserving the channel by sending a clear to send (CTS) frame incorporating a reservation time from the destination station to the source station.

7. The method according to claim 1, wherein each contention period is further divided into a plurality of contention windows each corresponding to a different priority.

8. The method according to claim 7, wherein the size of each contention window is dynamically adapted as a function of the number of stations in said network.

9. The method according to claim 8, wherein said number of stations is determined using management frames.

10. The method according to claim 8, wherein said number of stations is determined by calculating an estimate of the number of stations in said network as a function of the current size of the contention window and the time from when a station is permitted to transmit to the time it actually starts transmitting.

11. The method according to claim 1, wherein said backoff counter is suspended until arrival of a contention window having a priority corresponding to that of the transmission to be sent.

12. The method according to claim 1, wherein said step of initializing comprises choosing a random number of time slots between zero and the size of a contention window.

13. The method according to claim 1, wherein said backoff counter resumes from the count before receipt of the most recent FCD signal.

14. The method according to claim 1, wherein the failure to receive a CD signal within a CD time of receiving a FCD signal indicates that said FCD signal was a false alarm.

15. The method according to claim 1, further comprising the step of releasing said channel once reserved or decreasing a reservation counter in the event of a link failure.

16. The method according to claim 17, wherein said link failure is indicated via a frame adapted to indicate a CTS failure.

17. The method according to claim 17, wherein said link failure is indicated via a frame adapted to indicate an RTS failure.

18. The method according to claim 1, further comprising the step of releasing said channel in the event a maximum time allocated to a session has expired.

19. The method according to claim 1, further comprising the step of decrementing one or more reservation counters, each holding a reservation time wherein separate reservation counters are maintained for each session detected by a station and wherein said channel is considered released only when the reservation counter with the maximum reservation time expires.

20. A method of accessing a channel in a communication transceiver coupled to a communications channel, said method comprising the steps of:

establishing one or more contention windows upon termination of a current transmission session, each contention window assigned a priority and subdivided into a plurality of backoff time slots;

deferring zero or more contention windows until arrival of a contention window whose priority corresponds to the priority of a particular transmission;

initializing a backoff counter with a backoff count equal to a random number of backoff time slots;

decrementing said backoff counter while said medium is idle; and

attempting to reserve said channel upon expiration of said backoff counter.

21. The method according to claim 20, wherein the width of said backoff time slot is on the order of a carrier detect (CD) signal.

22. The method according to claim 21, wherein said CD signal is generated a relatively long time after the start of transmission, has a low false alarm rate and indicates that a transmission is starting.

23. The method according to claim 20, wherein the width of said backoff time slot is on the order of a fast carrier detect (FCD) signal.

24. The method according to claim 23, wherein said FCD signal is generated relatively shortly after the start of transmission, has a high false alarm rate and indicates that a transmission may be starting.

25. The method according to claim 20, further comprising the steps of:

suspending said backoff counter upon receipt of a fast carrier detect (FCD) signal;

resuming decrementing said backoff counter upon failure of a carrier detect (CD) signal to arrive within a CD time; and

deferring transmission until after the subsequent transmission upon receipt of a CD signal.

26. The method according to claim 20, wherein said step of attempting to reserve said channel comprises sending a request to send (RTS) frame incorporating a reservation time to a destination station.

27. The method according to claim 20, further comprising the step of declaring a link failure after attempting to reserve said channel a predetermined number of times.

28. The method according to claim 20, further comprising the step of increasing the size of a contention window upon failure to reserve said channel.

29. The method according to claim 20, further comprising of the step of decreasing the size of said contention window up to a minimum contention window size if the channel reservation was successful.

30. The method according to claim 20, further comprising the step of adjusting the size of each contention window as a function of the number of stations in said network.

31. A carrier sense multiple access (CSMA) based communications system wherein transmissions are preceded by a contention phase during which one or more transmitters compete for access to a channel, comprising:

means for establishing one or more contention windows, each contention window assigned a priority;

means for dividing each contention window into a plurality of backoff time slots wherein detection of a carrier sense signal during a time slot potentially indicates that said channel is busy;

backoff means adapted to count using a backoff timer a randomly selected backoff time equal to a multiple of a said backoff time slot; and

reservation means adapted to attempt reservation of said channel upon expiration of said backup timer and to enable transmission upon successful reservation of said channel.

32. The system according to claim 31, wherein said backoff means comprises:

means for suspending said backoff timer during backoff time slots wherein a fast carrier detect (FCD) signal is detected;

resuming said backoff timer during backoff time slots wherein no FCD signal is received; and

deferring transmission to a subsequent contention phase upon receipt of a carrier detect (CD) signal within a CD time of receipt of a FCD signal.

33. The system according to claim 31, wherein said FCD signal is detected faster than said CD signal.

34. The system according to claim 31, wherein said FCD signal has a higher false alarm rate than said CD signal.

35. The system according to claim 31, wherein said backoff means comprises means for restarting a transmission session upon receipt of a CD signal.

36. The system according to claim 31, wherein said backoff timer is adapted to generate a new random backoff time in response to said transmission session being deferred.

37. The system according to claim 31, wherein said backoff timer is adapted to continue counting from a point at which said backoff timer was previously stopped upon said transmission session being resumed.

38. The system according to claim 31, wherein said reservation means is adapted to send a request to send (RTS) frame incorporating a reservation time to a destination station.

39. The system according to claim 31, wherein said reservation means is adapted to send a clear to send (CTS) frame incorporating a reservation time from the destination station to the source station.

40. The system according to claim 31, wherein said means for dividing each contention window comprises adjustment means adapted to adjust the size of each contention window as a function of the number of stations contending for the channel in said contention window.

41. The system according to claim 40, wherein said number of stations is determined using management frames.

42. The system according to claim 40, wherein said number of stations is determined using means for calculating an estimate of the number of stations in said network as a function of the current size of the contention window and the time from when a station is permitted to transmit to the time it actually starts transmitting.

43. The system according to claim 31, further comprising means for releasing said channel once reserved in the event of a link failure.

44. The system according to claim 43, wherein said link failure is indicated via a frame adapted to indicate a CTS failure.

45. The system according to claim 43, wherein said link failure is indicated via a frame adapted to indicate an RTS failure.

46. The system according to claim 43, wherein said link failure is indicated via a frame adapted to indicate an ACK failure.

47. The system according to claim 31, further comprising means for releasing said channel in the event a maximum time allocated to a session has expired.

48. The system according to claim 31, further comprising means for decrementing one or more reservation counters, each holding a reservation time wherein separate reservation counters are maintained for each session detected by a station and wherein said channel is considered released only when the reservation counter with the maximum reservation time expires.

49. A communications transceiver for transmitting and receiving over a carrier sense multiple access (CSMA) frame based communications network wherein frame transmissions are separated by a contention interframe space (CIFS) during which one or more nodes compete for access to said network, comprising:

a coupling circuit for generating a receive signal received over said network and for outputting a transmit signal onto said network;

a transmitter adapted to modulate data to be transmitted in accordance with a modulation scheme so as to generate said transmit signal therefrom;

a receiver adapted to demodulate said receive signal in accordance with said modulation scheme so as to generate a receive data signal therefrom and adapted to generate carrier sense signals including a fast carrier detect (FCD) generated relatively shortly after the start of transmission, having a high false alarm rate and indicating that a transmission may be starting and a carrier detect (CD) signal generated a relatively long time after the start of transmission, having a low false alarm rate and indicating that a transmission is starting;

a media access control (MAC) comprising means adapted to;

establish one or more contention windows upon termination of a current transmission session, each contention window assigned a priority and subdivided into a plurality of backoff time slots;

defer zero or more contention windows until arrival of a contention window whose priority corresponds to the priority of a particular transmission;

initialize a backoff counter with a backoff count equal to a random number of backoff time slots;

decrement said backoff counter while said medium is idle;

attempt to reserve said channel upon expiration of said backoff counter;

transmit onto said channel upon successfully reserving said channel; and

a processor adapted to control the operation of said transmitter, receiver and MAC and to provide an interface between said MAC and an external host.

50. The transceiver according to claim 49, wherein termination of said current transmission session is indicated by a change in state of said channel from busy to idle.

51. The transceiver according to claim 49, wherein said MAC means is adapted to insert a contention interframe space (CIFS) between the end of a previous transmission session and the start of said channel contention period.

52. The transceiver according to claim 49, wherein reserving said channel comprises sending a request to send (RTS) frame incorporating a reservation time to a destination station.

53. The transceiver according to claim 49, wherein the size of each of said one or more contention windows is dynamically adjusted as a function of the number of stations in said network.

54. The transceiver according to claim 53, wherein said number of stations is determined using management frames.

55. The transceiver according to claim 53, wherein said number of stations is determined using means for calculating an estimate of the number of stations in said network as a function of the current size of the contention window and the time from when a station is permitted to transmit to the time it actually starts transmitting.

56. The transceiver according to claim 49, wherein said backoff counter is suspended until arrival of a contention window having a priority corresponding to that of the transmission to be sent.

57. The transceiver according to claim 49, wherein said step of initializing comprises choosing a random number of time slots between zero and the size of a contention window.

58. The transceiver according to claim 49, wherein said backoff counter resumes from the count before receipt of a most recent fast carrier detect (FCD) signal.

59. The transceiver according to claim 49, wherein the failure to receive a carrier detect (CD) signal within a CD time of receiving a fast carrier detect (FCD) signal indicates that said FCD signal was a false alarm.

60. A computer readable storage medium having a computer program embodied thereon for causing a suitably programmed system to access a channel in a carrier sense multiple access (CSMA) frame based communications system wherein frame transmissions are

separated by a contention interframe space (CIFS) during which one or more transmitters compete for access to said channel by performing the following steps when such program is executed on said system:

establishing one or more contention windows upon termination of a current transmission session, each contention window assigned a priority and subdivided into a plurality of backoff time slots;

deferring zero or more contention windows until arrival of a contention window whose priority corresponds to the priority of a particular transmission;

initializing a backoff counter with a backoff count equal to a random number of backoff time slots;

decrementing said backoff counter while said medium is idle;

attempting to reserve said channel upon expiration of said backoff counter; and

transmitting onto said channel upon successful reservation of said channel.

61. The computer readable storage medium according to claim 60, wherein the width of said backoff time slot is on the order of a carrier detect (CD) signal.

62. The computer readable storage medium according to claim 61, wherein said CD signal is generated a relatively long time after the start of transmission, has a low false alarm rate and indicates that a transmission is starting.

63. The computer readable storage medium according to claim 60, wherein the width of said backoff time slot is on the order of a fast carrier detect (FCD) signal.

64. The computer readable storage medium according to claim 63, wherein said FCD signal is generated relatively shortly after the start of transmission, has a high false alarm rate and indicates that a transmission may be starting.

65. The computer readable storage medium according to claim 60, further comprising the steps of:

suspending said backoff counter upon receipt of a fast carrier detect (FCD) signal;

resuming decrementing said backoff counter upon failure of a carrier detect (CD) signal to arrive within a CD time; and

deferring transmission until after the subsequent transmission upon receipt of a CD signal.

66. The computer readable storage medium according to claim 60, wherein said FCD signal is generated more quickly after transmission than said CD signal.

67. The computer readable storage medium according to claim 60, wherein said FCD signal has a higher false alarm rate than said CD signal.

68. The computer readable storage medium according to claim 60, wherein said CD signal has a higher probability of detection than said CD signal.

69. The computer readable storage medium according to claim 60, further comprising the step of subsequently restarting a transmission session upon receipt of a carrier detect (CD) signal.

70. The computer readable storage medium according to claim 60, wherein the size of each said one or more contention windows is dynamically adjusted as a function of the number of stations in said network.

71. The computer readable storage medium according to claim 70, wherein said number of stations is determined using management frames.

72. The computer readable storage medium according to claim 70, wherein said number of stations is determined using means for calculating an estimate of the number of stations in said network as a function of the current size of the contention window and the time from when a station is permitted to transmit to the time it actually starts transmitting.

73. The computer readable storage medium according to claim 60, wherein said step of transmitting comprises the step of sending a request to send (RTS) frame incorporating a reservation time to a destination station.

74. The computer readable storage medium according to claim 60, wherein said step of transmitting comprises sending a clear to send (CTS) frame incorporating a reservation time from the destination station to the source station.

75. The computer readable storage medium according to claim 60, further comprising the step of releasing said channel once reserved in the event of a link failure.

76. The computer readable storage medium according to claim 75, wherein said link failure is indicated via a frame adapted to indicate a CTS failure.

77. The computer readable storage medium according to claim 75, wherein said link failure is indicated via a frame adapted to indicate an RTS failure.

78. The computer readable storage medium according to claim 60, further comprising the step of releasing said channel in the event a maximum time allocated to a session has expired.

79. The computer readable storage medium according to claim 60, further comprising the step of decrementing one or more reservation counters, each holding a reservation time wherein separate reservation counters are maintained for each session detected by a station and wherein said channel is considered released only when the reservation counter with the maximum reservation time expires.

80. A method of accessing a communications channel in a network including a plurality of stations, said method comprising the steps of:

establishing one or more contention windows in which said plurality of stations compete for access to said communications channel;

assigning a different priority to each of said one or more contention windows;

initializing a backoff counter with a backoff count equal to a random number of backoff time slots;

waiting until the arrival of a contention window having a priority corresponding to the priority of transmission of the particular station and upon the arrival thereof decrementing said backoff counter while said medium is idle; and

attempting to reserve said communications channel upon expiration of said backoff counter.

81. The method according to claim 80, wherein the size of said contention windows is increased upon a failure by a station to reserve said communications channel.

82. The method according to claim 80, wherein the size of said contention windows is decreased increased upon the successful reservation of said communications channel by a station.

83. A method of accessing a communications channel in a network including a plurality of stations, said method comprising the steps of:

establishing one or more contention windows in which said plurality of stations compete for access to said communications channel;

assigning a priority to each of said one or more contention windows;

initializing a backoff counter with a backoff count equal to a random number of backoff time slots;

waiting until the arrival of a contention window having a priority corresponding to the priority of transmission of the particular station and upon the arrival thereof decrementing said backoff counter while said medium is idle;

attempting to reserve said channel upon expiration of said backoff counter; and

adjusting the size of a contention window as a function of the number of stations contending for said communications channel in the said contention window.

84. The method according to claim 83, wherein the size of said contention windows is increased upon a failure by a station to reserve said communications channel.

85. The method according to claim 83, wherein the size of said contention windows is decreased increased upon the successful reservation of said communications channel by a station.

86. The method according to claim 83, wherein said number of stations is calculated in accordance with the following

$$N_{estimated} = \frac{CW}{t} - 1$$

where the expected value of t is given by

$$E[t] = \frac{CW}{N+1}$$

and wherein CW is the contention window within which each station randomly selects a backoff value, N is the number of stations contending for said communications channel at any given time, t is the actual time from the moment the stations are allowed to transmit until one station starts transmitting and $E(t)$ is the expected value of t.

87. A method of accessing a communications channel in a network including a plurality of stations, said method comprising the steps of:

establishing one or more contention windows in which said plurality of stations compete for access to said communications channel;

estimating the number of stations in said network as a function of the size of a current contention window and the time t which is the actual time from the moment the stations are allowed to transmit until one station starts transmitting;

adjusting the size of each of said one or more contention windows as a function of the estimated number of stations in said network; and

each station deferring an attempt to reserve said communications channel until the arrival of a contention window associated with the particular transmission.

88. A method of accessing a communications channel in a network including a plurality of stations, said method comprising the steps of:

each station generating a virtual carrier sense signal indicating that said communications channel is busy; and

transmitting a message onto said network containing an updated reservation counter time when said virtual carrier sense signal indicates said communication channel is currently busy and the station currently reserving said communications channel determines that the reservation counter associated with its session is to be updated.

89. The method according to claim 88, wherein said updated reservation counter is decreased.

90. The method according to claim 88, wherein said updated reservation counter is increased.

91. The method according to claim 88, wherein said updated reservation counter is set to zero in order to cause said communications channel to be released.

92. A method of accessing a communications channel in a network including a plurality of stations, said method comprising the steps of:

detecting one or more sessions established between stations in said network;

maintaining a reservation counter in each station for each session detected by a particular station, said reservation counter holding a reservation time;

decrementing each reservation counter periodically; and

considering said communications channel as being released when the reservation counter with the maximum reservation time expires.

93. A method of accessing a communications channel in a power line carrier based network including a plurality of stations, said method comprising the steps of:

establishing one or more contention windows in which said plurality of stations compete for access to said communications channel;

assigning a different priority to each of said one or more contention windows;

each station sensing said communication channel for the presence of carrier signal;

each station wishing to transmit, selecting a random backoff time;

each station waiting until the arrival of a contention window having a priority associated therewith corresponding to the priority of transmission of the particular station;

within the contention window having matching priority, waiting random backoff time;

upon expiration of said backoff time, attempting to reserve said communications channel; and

suspending countdown of said backoff time if presence of carrier signal is detected.

94. A method of accessing a communications channel in a network including a plurality of stations, said method comprising the steps of:

establishing one or more contention windows in which said plurality of stations compete for access to said communications channel;

initializing a backoff counter with a backoff count equal to a random number of backoff time slots;

waiting until the arrival of a contention window corresponding to the particular transmission and upon the arrival thereof decrementing said backoff counter while said medium is idle;

attempting to reserve said channel upon expiration of said backoff counter;

declaring the existence of a hidden station after a predetermined number of failed attempts to reserve said communications channel; and in accordance therewith,

increasing the width of said backoff time slot and repeating said steps of initializing, waiting and attempting to reserve said communications channel.

95. A method of accessing a communications channel in a network including a plurality of stations, said method comprising the steps of:

segmenting a transmission session into a plurality of frames;

establishing one or more contention windows in which said plurality of stations compete for access to said communications channel;

initializing a backoff counter with a backoff count equal to a random number of backoff time slots;

waiting until the arrival of a contention window corresponding to the particular transmission and upon the arrival thereof decrementing said backoff counter while said medium is idle;

attempting to reserve said channel, upon expiration of said backoff counter, for a duration sufficient to transmit said plurality of frames;

transmitting said plurality of frames from a transmitting station to a receiving station; and

said receiving station transmitting an ACK reply to said transmitting station containing a plurality of ACK bits, each ACK bit indicating whether one of said frames is to be retransmitted.

96. A method of accessing a communications channel in a network including a plurality of stations, said method comprising the steps of:

estimating the number of stations in said communications network in accordance with the following

$$N_{estimated} = \frac{CW}{t} - 1$$

where the expected value of t is given by

$$E[t] = \frac{CW}{N+1}$$

and wherein CW represents the width of one of one or more contention windows within which each station randomly selects a backoff time slot, N is the number of stations contending for the channel at any given time, t is the actual time from the moment the stations are allowed to transmit until one station starts transmitting and $E(t)$ is the expected value of t.

97. A method of accessing a communications channel in a network including a plurality of stations, said method comprising the steps of:

transmitting messages from a transmitting station to a receiving station;

said receiving station transmitting an acknowledge message following the receipt of a message;

said transmitting station sending a request acknowledge (RA) message to said receiving station upon failure to receive said acknowledge message; and

said transmitting station repeatedly sending a RA message to said receiving station upon continued failure of said transmitting station to receive said acknowledge message.

98. The method according to claim 97, wherein said step of repeatedly sending a RA message to said receiving station is repeated until an acknowledge is received by said transmitting station.

99. The method according to claim 97, wherein said step of repeatedly sending a RA message to said receiving station is repeated a max_RA_retries number of times.